

# NASA TECH BRIEF

## John F. Kennedy Space Center



NASA Tech Briefs announce new technology derived from the U.S. space program. They are issued to encourage commercial application. Tech Briefs are available on a subscription basis from the National Technical Information Service, Springfield, Virginia 22151. Requests for individual copies or questions relating to the Tech Brief program may be directed to the Technology Utilization Office, NASA, Code KT, Washington, D.C. 20546.

### Wireless Telemetry System for Floating Bodies

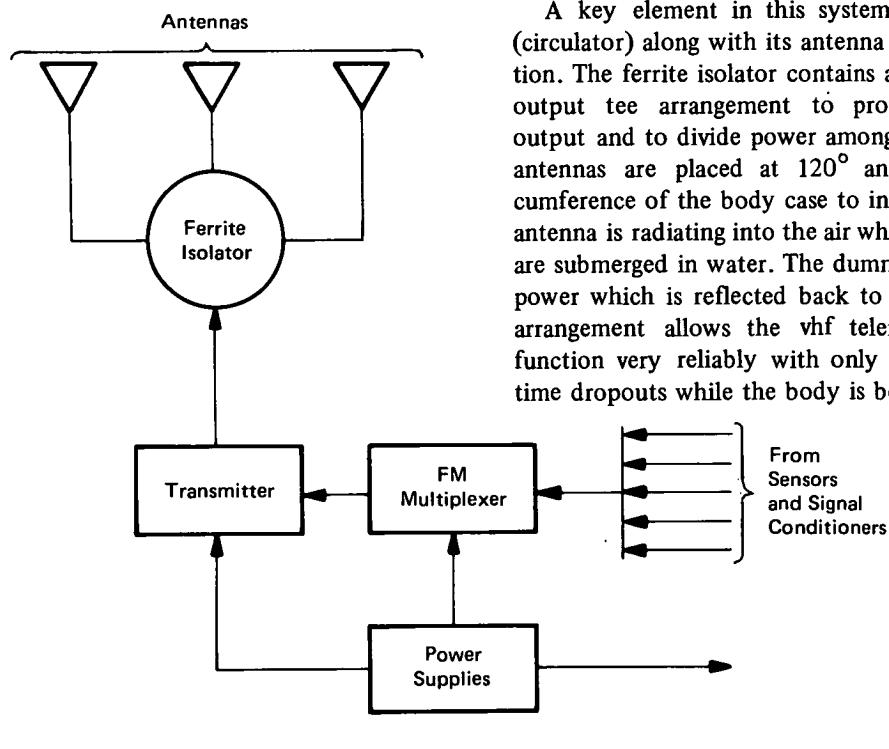
A self-contained telemetry transmitter system has been developed for use on large unstabilized floating bodies. The floating bodies may be cylindrical, such as parts of rockets or tank containers, or other differently shaped enclosures towed by ships. The essential features of the unit include rugged waterproof cables and equipment containers, low power, sturdy antenna construction, and easy equipment setup and serviceability. These features were achieved without sacrificing the accuracy and reliability of the entire measurement system.

The basic transmitter unit (see figure) contains a standard IRIG FM (Inter-Range Instrumentation Group, Frequency-Modulated) multiplexer, solid-state input operational amplifiers, a standard 3-watt FM transmitter,

and a ferrite isolator with coaxial tees and a dummy load. A 24-volt power is provided from a separate container mounted adjacent to the transmitter package and interconnected with waterproof cables. Four 12-volt, rechargeable, nonliquid, electrolyte-type batteries are connected in series parallel to provide the required power. A separate battery package is used to expedite battery servicing and handling requirements. The batteries are not affected by orientation.

Each sensor is connected to the transmitter unit with neoprene rubber insulated cables having connectors insulated with molded neoprene rubber. Threaded stainless steel locking sleeves are used to secure all cable connections to their mating connectors.

A key element in this system is a ferrite isolator (circulator) along with its antenna design and configuration. The ferrite isolator contains a dummy load and an output tee arrangement to protect the transmitter output and to divide power among three antennas. The antennas are placed at  $120^\circ$  angles around the circumference of the body case to insure that at least one antenna is radiating into the air while the other antennas are submerged in water. The dummy load dissipates any power which is reflected back to the transmitter. This arrangement allows the vhf telemetry equipment to function very reliably with only perhaps minor short-time dropouts while the body is being towed. Dropouts



(continued overleaf)

may occur when the body is towed at relatively high speeds and with long towing lines, particularly when it is rolling at a relatively high rate with a pitchdown attitude.

The three antennas are modified ground plane types. The vertical radiator is cut for a quarter wavelength, and the metal casing of the body is used as a ground plane surface. A quarter wavelength reflector with a Teflon rod, spaced horizontally between the reflector and the radiator, provides more gain and some forward directivity to the antenna radiation pattern. The reflector with its spacer also provides more physical strength to the antenna structure.

The major system characteristics are as follows:

- a. The system has an 18-channel capacity. To date, a 5-channel system has been tested.
- b. System response is from dc up to 1000 Hz (depending on which IRIG subcarrier frequencies are used).
- c. Transmitter frequency is 245.3 MHz.
- d. The power supply is 24 volts dc at 20 ampere-hours.
- e. Battery drain is approximately 1 ampere.
- f. Transmitter output is approximately 3 watts.

#### Note:

Requests for further information may be directed to:

Technology Utilization Officer  
Kennedy Space Center  
Code AD-PAT  
Kennedy Space Center, Florida 32899  
Reference: B74-10028

#### Patent status:

Inquiries concerning rights for the commercial use of this invention should be addressed to:

Patent Counsel  
Kennedy Space Center  
Code AD-PAT  
Kennedy Space Center, Florida 32899

Source: L. T. Fain and H. E. Cribb  
Kennedy Space Center  
(KSC-10855)